

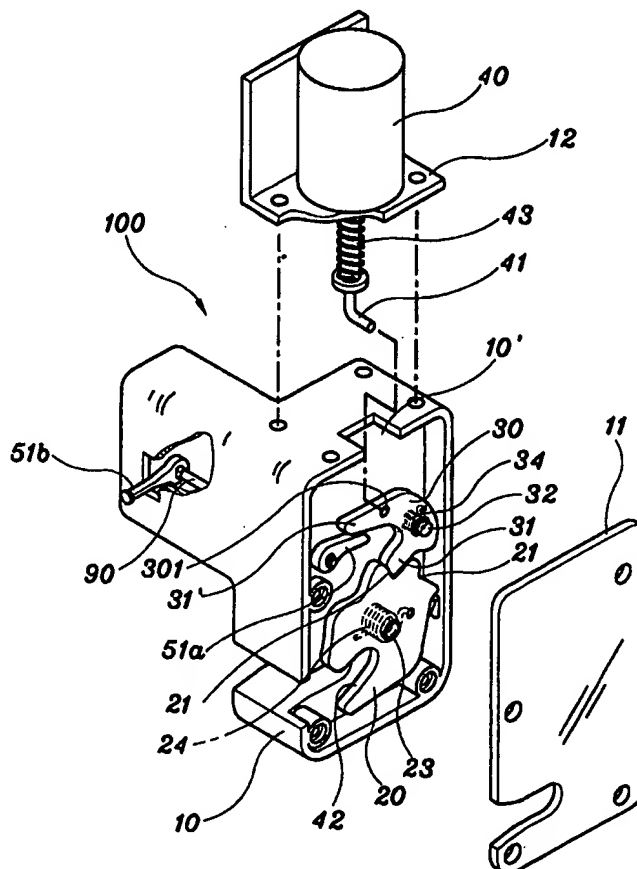
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(54) Title: ELECTRIC DOOR LATCH AND LOCKING SYSTEM OF AUTOMOBILES

## (57) Abstract

The present invention relates to a door latch and locking system by which doors of automobiles may be electrically locked, unlocked and opened according to electric signals through mechanical construction, which includes a housing block, a latch gear having at least two locking grooves and an elastic spring, a fall gear having at least two protrusions corresponding to the locking grooves of the latch gear, casings to cover said housing, a driving member installed on one of the casings and having an electric element which is integrated with said driving member, the electric element extended through a through-hole of the housing block, and manual unlocking lever gears associated with the driving shaft, so that it is possible to manufacture and assemble the system in more simply way at a relatively low cost since the complicated components installed externally, thereby preventing car theft and malfunction possibly caused by the car theft.



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# **ELECTRIC DOOR LATCH AND LOCKING SYSTEM OF AUTOMOBILES**

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## **FIELD OF THE INVENTION**

The present invention relates generally to an electric door latch and locking system of automobiles. More particularly, the present invention relates to an electric door latch and locking system of automobiles in which doors of automobiles may be electrically locked, unlocked and opened according to electric signals through mechanical construction.

## **DESCRIPTION OF THE PRIOR ART**

15 In general, door latch and locking systems installed in automobiles have been developed to prevent burglaries for the sake of security. Recently, such a door latch and locking system has a tendency towards utilizing electric signals for partial control of functions of such a door latch and locking system and this technique has already well-known.

20 In conventional mechanical door latch and locking systems which are currently used, as shown in Fig. 13A to Fig. 13C, if a driver pulls a door handle, a locking plate gear and other main door lock parts are unlocked by mechanical operation of a middle locking lever which is connected to the outside of a housing by means of a wire load and a steel load connected to a door hanger,  
25 thereby unlocking the door mechanically.

Conventionally, the doors are opened by mechanical operation. However,

such a conventional mechanical door latch and locking system has a risk of car theft, since an actuator of electronic devices to be adopted in an unlock push button B and a solenoid shaft or assembly joints are exposed to the external. Therefore, the actuator and the solenoid equipment of the electronic door latch  
5 and locking system of automobiles are still energized even after the automobile is stopped its running, so that the actuator and the solenoid equipment may be turned on due to some impact by means of a steel or hook which is inserted into some gabs between external window glasses and the doors.

In order to resolve the above disadvantages, an electronic door latch and  
10 locking system has been proposed in Korean Patent Laying-Open Publication 92-6603. This door latch and locking system includes a door locking means, an internal operation means, a locking handle, an actuator, and a control means, in which the control means generates to the actuator a control signal for locking or unlocking the doors according to a decision of a decision means which  
15 determines whether the door is locked or unlocked by operation of the locking handle and the internal operation means.

Figs. 8B and 8C show a conventional semi-automatic door latch and locking system. In this semi-automatic door latch and locking system, electronic components such as actuators and solenoids installed in door panels  
20 are indirectly connected to a locking lever gear H or a locking plate gear G via an intermediate connecting load F to be controlled by pushing an on/off switch. However, this conventional semi-automatic door latch and locking system has still disadvantages that main components connected to the electronic equipments are still exposed in the door panel so that it is impossible to remove  
25 the risk of the car theft by using the abnormal objects to open the doors as above.

Hereinabove, unexplained symbol C is a mechanical door latch and locking system, D is an inside door handle hanger load, E is a push nob/lock button rod, and I is a key-lock cylinder/connecting rod.

Further, it is difficult to precisely couple the intermediate load and a  
5 plurality of connecting joints and manufacturing cost becomes increased due to the complicated components while degrading assembling efficiency.

Furthermore, noise is generated since many components exposed in the door panels come into contact with the door panels. This mechanical door latch and locking system causes further risks of car theft since it is possible to  
10 forcibly unlock the door latch and locking system by inserting abnormal instruments such as steel pieces, hooks or all-purpose tools into small spaces between the car windows.

Even though a burglar alarm is installed in case of luxury cars, it is still impossible to prevent car theft after once the door is opened with such abnormal  
15 instruments.

In this publication, however, most of problems of the conventional door latch and locking systems are enumerated but any practical resolution is suggested. For example, in case of electronic door latch and locking system, it has failed to disclose how to install principal components in the door panels  
20 without exposing them while eliminating other unnecessary components for the sake of security and instead to provide new components operating in relation to the electronic equipments.

Further, in case of electrically operating door latch and locking system according to electric signals, it is still necessary to provide manually operating  
25 system in case malfunction of an electric driving means or power failure. This electric door latch and locking system has still another problem that the

productivity is degraded due to the complicated structure having redundant control systems.

### **DISCLOSURE OF THE INVENTION**

5

The present invention is an electric door latch and locking system in which a housing block is provided for compact installation of principal components of an electric door latch and locking system therein to prevent the components from being exposed so as to eliminate possibility to come into contact with  
10 external objects, thereby preventing doors from being forcibly opened by means of external objects.

It is an objective of the present invention to provide an electric door latch and locking system in which principal power source is to be an electric circuit in series for providing electric energy to the electric driving means of the door  
15 latch and locking system in series to directly transmit drawing force of the driving means to respective components.

It is still another objective of the present invention to provide an electric door latch and locking system in which key lock cylinders installed in door handle housings in the outside of doors are eliminated to prevent all-purpose  
20 tools from being inserted, and on/off sensor switches having various frequencies are adopted to be remotely controlled.

It is a further objective of the present invention to provide an electric door latch and locking system in which principal power source is to be an electric circuit in series for providing electric energy to the electric driving means of the  
25 door latch and locking system in series to directly transmit drawing force of the driving means to respective components.

It is a still further objective of the present invention to provide an electronic circuit arrangement to realize the above construction of the door latch and locking system.

In order to obtain the aforementioned objectives of the present invention, the inventive door latch and locking system including: a housing block in which all principal components of said door latch and locking system are installed,

a latch gear having at least two locking grooves and an elastic spring to constrain or release a striker pin by rotating with relation to a hinge shaft thereof,

a fall gear having a first protrusion corresponding to said locking grooves to be associated with said latch gear and rotating with relation to a hinge shaft;

casings to cover said housing, one of said casings being attached to a door panel;

driving means installed on another casing and having an electric member which is integrated with said driving means, said electric member being pulled according to an electric signal and extended via a through-hole of said housing block to a connecting hole of said fall gear to be fitted therewith;

said fall gear formed in the shape of a reversed "C" and including a second protrusion and a connecting hole;

a first manual unlocking lever gear installed under said second protrusion of said fall gear and associated with a driving shaft; and

a second manual unlocking lever gear protrudedly formed outside said housing block and associated with said driving shaft.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a schematic perspective view showing principal parts of an electric door latch and locking system of automobiles according to an embodiment of the present invention;

Fig. 2A is a cross-sectional view of the door latch and locking system which is locked;

Fig. 2B is a cross-sectional view of the door latch and locking system which is initially unlocked;

Fig. 2C is a cross-sectional view of the door latch and locking system which is completely unlocked;

Fig. 3 is a schematic perspective view showing principal parts of an electric door latch and locking system of automobiles according to a second embodiment of the present invention;

Fig. 4 is a schematic perspective view of principal parts of an electric door latch and locking system of automobiles according to a third embodiment of the present invention;

Fig. 5 is a schematic perspective view of principal parts of an electric door latch and locking system of automobiles according to a fourth embodiment of the present invention;

Fig. 6 is a schematic perspective view of principal parts of an electric door latch and locking system of automobiles according to a fifth embodiment of the present invention;

Fig. 7A is a cross-sectional view of the door latch and locking system of Fig. 3, in which the door is locked;

Fig. 7B is a cross-sectional view of the door latch and locking system of



Fig. 3, in which the door is initially unlocked;

Fig. 7C is a cross-sectional view of the door latch and locking system of Fig. 3, in which is completely unlocked;

Fig. 8 is a schematical perspective view of principal parts of an electric door latch and locking system of automobiles according to a sixth embodiment  
5 of the present invention;

Fig. 9A is a cross-sectional view of the door latch and locking system of Fig. 8, in which the door is locked;

Fig. 9B is a cross-sectional view of the door latch and locking system of  
10 Fig. 8, in which the door is initially unlocked;

Fig. 9C is a cross-sectional view of the door latch and locking system of Fig. 8, in which is completely unlocked;

Fig. 10 is a schematical perspective view of principal parts of an electric door latch and locking system of automobiles according to a seventh  
15 embodiment of the present invention;

Fig. 11A to Fig. 11C are electric circuit diagrams commonly adopted in the door latch and locking system of the present invention;

Fig. 11D and Fig. 11F are electric circuit diagrams commonly adopted in the door latch and locking system of the present invention;

20 Fig. 12 is a constructional view of an inner switching of a door handle according to the present invention; and

Fig. 13A to Fig. 13C are schematic perspective views of the prior art.

### **BEST MODE FOR CARRYING OUT THE INVENTION**

25

According to the present invention, an electric door latch and locking

system of automobiles includes a latch (fork) gear rotating by elastic force of an elastic spring with relation to a hinge in a body in a door latch and locking system corresponding to a striker pin installed in a body frame, and a fall (locking plate) gear driven to be introduced into a locking groove of the latch gear by a driving shaft.

The fall (locking plate) gear is in the shape of reversed "C". On the housing in which the fall gear and the latch gear are installed is installed a driving means including a pulling means and an electric means for operating according to an electric signal. The electric means has a front end penetrating the housing block and is connected with the fall gear for mechanical control. The driving means is connected with an on/off switch of a remote controller for remotely controlling functions of a main control system with main power source of rated voltage, and a switch installed in a door handle for producing signals to operate a key lock cylinder and to lock/unlock the door latch and locking system.

According to another aspect of the invention, power sources are sequentially connected to the driving means of the door latch and locking system and the power supply is transmitted sequentially through a control switch installed behind the latch gear, so that the driving means is driven to open the door.

A manual unlocking lever gear is installed at one side of the fall gear and manually and mechanically operating by a manual unlocking lever in case of emergency.

Therefore, if respective switches of door handles are energized by inserting a key into the key cylinder or pushing the on/off switch of the remote controller, the switch in the door handle is automatically pushed when the door handle is

pulled and supplies power to the driving means automatically, so that the fall gear is automatically operated to unlock the door. Even though the electric signal is cut off, the manual unlocking lever installed in the housing block can be manually operated in the car to unlock the door latch and locking system.

5       The present invention will now be apparent from the description hereinbelow detailed with reference to the drawings.

Fig. 1 and Figs. 2A to 2C are disassembled views of an electric door latch and locking system according to an embodiment of the present invention, which includes electronic equipments enabling cylinder operation, solenoid  
10 equipments or actuators.

Fig. 1 is a schematic perspective view of the principal parts of a door latch according to the invention and Figs. 2A to 2C are schematic cross-sectional views for explaining the operation of the door latch of Fig. 1.

In an electric door latch and locking system 100, a striker pin 75 of a body  
15 frame is constraint in or released from a latch gear 20. the latch gear 20 is installed at one end part of a driving shaft 90 rotatably with relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is installed at one side of the latch gear 20 and includes  
20 protrusions 31 and 31' to be suspended by the locking grooves 21 and 22 of the latch gear 20. The fall gear 30 is coupled with the latch gear 20 and also rotatable by a driving shaft 90. A housing block 10 is covered with a casing 11 to be attached on a door panel (not shown). The housing block 10 is covered with another casing 12 on which upper surface is installed a driving means 40  
25 having an electric member 41 to be pulled according to an electric signal. The electric member 41 is integrated in the driving means 40 and extended via a

through-hole 10' of the housing block 10 to be coupled with a connecting hole 301 of the fall gear 30 in the housing block 10.

The fall gear 30 is in the shape of a reversed "C" and includes the protrusions 31 and 31' and a connecting hole 301.

5 Also, according to the present invention, a manual operating system is further provided in the door latch and locking system and comprises a manual unlocking lever gear 51a installed under the protrusion 31' of the fall gear 30 and a manual unlocking lever 51b protrudedly formed outside of the housing block 10, wherein the manual unlocking lever gear 51a and the manual  
10 unlocking lever 51b are associated with the driving shaft 90. The protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed toward inside the automobiles for driver's manual operation but not exposed to the external to prevent the car theft.

15 In the above electric door latch and locking system, since this manual operation system is necessary for emergency, the present invention provides such a manual operation system as described hereinabove and the manual operating system is not exposed to the external for preventing abnormal contact of car theft.

20 The driving means 40 is to be an actuator or other electronic means capable of cylinder operation, and more preferably to be a solenoid equipment.

The door latch and locking system 100 according to the present invention is characterized in that all of the components are assembled and coupled in the housing block 10 and then completely sealed with the cover casings 11 and 12.

25 According to the above door latch and locking system of the present invention, it is possible to prohibit the use of abnormal instruments or all-

purpose tools to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from the door handle housing and instead a key sensor is provided for remote control according to the on/off signals, thereby assuring of the security of the car.

5       The housing block 10 is preferably in the shape of "L", however, it is also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and shifting ranges of the window glasses, so as to secure enough space to couple the driving means 40 onto the outer surface of the housing block 10.

10       The fall gear 30 is coupled with the latch gear 20 by inserting the protrusion 31 of the fall gear 30 into the locking groove 22 of the latch gear 20. The fall gear 30 is also coupled with the manual unlocking lever gear 51a at the other protrusion 31' thereof. The manual unlocking lever gear 51a is associated with one end part of the driving shaft 90, of which the other end part is  
15       associated with the manual unlocking lever 51b.

      If the manual unlocking lever 51b is driven manually, the manual unlocking lever gear 51a pushes the protrusion 31' of the fall gear 30 and the other protrusion 31 is released from the locking groove 22 of the latch gear 20, so that the released latch gear 20 rotates by the elastic force of the elastic spring  
20       24 and the strike pin 75 is released from the latch gear 20, thereby opening the door initially.

      Reversely, if a driver close the door, the elastic springs located on the gears become extended to constrain the striker pin attached on car chassis. Subsequently, the fall gear 30 is suspended by the locking groove of the latch  
25       gear 20, so that tight suspension of the striker pin is performed, thereby keeping the door firmly closed.

Fig. 3 is a perspective view of an electric door latch and locking system according to a second embodiment, in which a solenoid equipment, an actuator or an electronic equipment having cylinder operation is adopted.

Referring now to Fig. 3, wherein like reference characters designate like or  
5 corresponding parts throughout the several view.

In a door latch and locking system 100 as shown in Fig. 3, a striker pin 75 of a housing block 10 is constrained in or released from a latch gear 20. The latch gear 20 is installed at one end part of a driving shaft 90 rotatably with relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least  
10 two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is installed at one side of the latch gear 20 and includes protrusions 31 and 31' to be suspended by the locking grooves 21 and 22 of the latch gear 20, so that the fall gear 30 is coupled with the latch gear 20. The fall gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is  
15 supported, so that the fall gear 30 returns to the latch gear 20 by elastic force of the elastic spring 34. The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown). The housing block 10 is covered with another casing 12 on which upper surface is installed a driving means 40 having an electric member 41 to be pulled according to an electric signal. The electric  
20 member 41 is integrated in the driving means 40 and extended through a through-hole 10' of the housing block 10 to be coupled with a connecting hole 52 of an unlocking cam gear 54 in the housing block 10.

The fall gear 30 is formed in the shape of a reversed "C" and includes the protrusions 31 and 31'. An unlocking lever gear 54' is installed under the  
25 protrusion 31' of the fall gear 30 and an unlocking cam gear 54" is protrudedly formed outside of the housing block 10, wherein the unlocking lever gear 54'

and the unlocking cam gear 54" are associated with a driving shaft 90.

The unlocking cam gear 54" has a connecting hole 52 which is associated with an electric member 41 of a driving means 40, so that pulling force of the driving means 40 is transmitted through the electric member 41 and the  
5 associated connecting hole 52 to the unlocking cam 54" to consecutively operate all components.

The unlocking cam gear 54' has an end part on which a manual unlocking lever 53a and a driving shaft 53b are coupled so that the manual unlocking lever 53a is exposed to the inside of automobiles for driver's manual operation in case  
10 of emergency but not exposed to the external to prevent the car theft.

The driving means 40 is to be an actuator or other electronic means capable of cylinder operation, and more preferably to be a solenoid.

The door latch and locking system 100 according to the present invention is characterized in that all of the components are assembled and coupled in the  
15 housing and then completely sealed with the cover cases 11 and 12. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external instruments can forcibly invade the entrance part. Further, the protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed to the inside of automobiles  
20 for driver's manual operation but not exposed in the door panel to prevent the car theft.

The housing block 10 is preferably in the shape of "L", however, it is also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and the shifting  
25 range of the window glasses, so as to secure enough space to couple the driving means 40 onto the outer surface of the housing block 10.

The fall gear 30 is coupled with the latch gear 20 by inserting the protrusion 31 of the fall gear 30 into the locking groove 22 of the latch gear 20. The fall gear 30 is also coupled with the unlocking cam gear 54' at the other protrusion 31' thereof. The unlocking cam gear 54' is associated with one end  
 5 part of the driving shaft 90, of which the other end part is associated with the unlocking cam gear 54".

If the unlocking cam gear 54" is driven manually, the unlocking cam gear 54' pushes the protrusion 31' of the fall gear 30 and the other protrusion 31 is released from the locking groove 22 of the latch gear 20, so that the released  
 10 latch gear 20 rotates by the elastic spring 24 and the strike pin 75 is released from the latch gear 20, thereby opening the door initially.

Fig. 4 is a perspective view a third embodiment of the door latch and locking system, in which a solenoid equipment, an actuator or an electronic equipment having cylinder operation is adopted.

15 Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several view.

In the door latch and locking system 100 as shown in Fig. 4, a striker pin 75 of a housing block 10 is constrained in or released from a latch gear 20. The latch gear 20 is installed at one end part of a driving shaft 90 rotatably with  
 20 relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is installed at one side of the latch gear 20 and includes protrusions 31 and 31' to be suspended by the locking grooves 21 and 22 of the latch gear 20, so that the fall gear 30 is coupled with the latch gear 20. The fall  
 25 gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by the elastic force



of the elastic spring 34.

The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown) and has a through-hole 10' to insert a safety tube 46 wrapping an electric member 41 of a driving means 40 to protect it. The door latch and  
5 locking body 100 and the driving means 40 are separately installed, for example, in such a manner that the driving means 40 is installed in a door panel securing the shifting range of a window glass. The separately installed electric member 41 of the driving means 40 is introduced into the through-hole 10' of the housing block 10 to be coupled with a connecting hole 301 of the fall gear  
10 30 in the housing block 10.

The fall gear 30 is coupled with the latch gear 20 by inserting its protrusion 31 into a locking groove 22 of the latch gear 20. A manual unlocking lever gear 51a is installed under the other protrusion 31' of the fall gear 30 and protrudedly formed outside the housing block 10, wherein the manual unlocking lever gear  
15 51a is associated with an end part of a driving shaft 90, of which the other end part is associated with a manual unlocking lever 51b.

If the manual unlocking lever 51b is driven manually, the manual unlocking lever gear 51a pushes the protrusion 31' of the fall gear 30 and the other protrusion 31 is released from the locking groove 22 of the latch gear 20,  
20 so that the released latch gear 20 rotates by the elastic spring 24 and the strike pin 75 is released from the latch gear 20, thereby opening the door initially.

The door latch and locking system 100 according to the present invention is characterized in that all of the components are assembled and coupled in the housing 10 and then completely sealed with a cover case 11 and the exposed  
25 electric member 41 is covered with the safety tube 46. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external

instruments can forcibly invade the entrance part. Further, the protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed inside automobiles for driver's manual operation but not exposed in the door panel to prevent the car theft.

5 According to the above door latch and locking system of the present invention, it is possible to prohibit the use of abnormal instruments or all-purpose tools to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from a door handle housing and instead a key sensor is provided for remote control according to the on/off signals,  
10 thereby assuring of the security of the car.

The housing block 10 is preferably in the shape of "L", however, it is also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and shifting range of the window glasses, so as to secure enough space to couple the driving means  
15 40 onto the outer surface of the housing block 10.

The driving means 40 is to be an actuator or other electronic means capable of cylinder operation, and more preferably to be a solenoid.

The fall gear 30 is in the shape of a reversed "C" and includes the the protrusions 31 and 31' and a connecting hole 301. The fall gear 30 is coupled  
20 to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by the elastic force of the elastic spring 34.

The fall gear 30 is coupled with the latch gear 20 by inserting the protrusion 31 of the fall gear 30 into the locking groove 22 of the latch gear 20.  
25 The fall gear 30 is also coupled with the manual unlocking lever gear 51a at the other protrusion 31' thereof. The manual unlocking lever 51b is associated

with one end part of the driving shaft 90, of which the other end part is associated with the manual unlocking lever gear 51a.

Fig. 5 is a perspective view a fourth embodiment of the door latch and locking system, in which a motor is adopted as a driving means. Figs. 7A to 7C are views showing the operation of the door latch and locking system of Fig. 5.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several view.

In a door latch and locking system 100 as shown in Fig. 5, a latch gear 20 is installed at one end part of a driving shaft 90 rotatably with relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by elastic force of the elastic spring 34.

The fall gear 30 includes protrusions 31 and 31' and a jaw 33, and is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to a locking groove 22 of the latch gear 20 by elastic force of the elastic spring 34. On the opposite side of the fall gear 20, a rotation cam gear 60 is coupled with the fall gear 30 and the rotation cam gear 60 has also a jaw 61.

The rotation cam 60 is externally connected with a motor 70 so that the rotation cam 60 rotates in response to the operation of the motor 70. If the rotation cam 60 rotates, the jaw 61 of the rotation cam 60 comes into contact with the jaw 33 of the fall gear 30 and the protrusion 31 of the fall gear 30 is released from the locking groove 22 of the latch gear 20, so that the released latch gear 20 rotates by the elastic spring 24 and the strike pin 75 is released

from the latch gear 20, thereby opening the door initially.

The housing block 10 is preferably in the shape of "L", however, it is also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and the shifting  
5 range of the window glasses, so as to secure enough space to couple the driving means 40 onto the outer surface of the housing block 10.

Hereinbelow, the way that the motor 70 opens the door according to electric signals in more detail.

In order to control the operation of the rotation cam 60, power source of the  
10 motor 70 is connected with a sensor switch 80 of which electric contact is connected or cut off by movement of the latch gear 20.

The sensor switch 80 has a contact rod 81 which is electrically turned on or off and comes into contact with the latch gear 20 which rotates with relation to the hinge shaft 23.

15 If the latch gear 20 is in the fully or half locked state, all the components are in contact each other and the motor 70 can be supplied with power. Therefore, if the sensor switch 80 is applied with power from external power source, the motor 70 is driven and the rotation cam 60 connected to the shaft of the motor 70, so that the fall gear 30 is operated and the protrusion 31 is  
20 released from the locking groove 22, thereby the latch gear 20 is unlocked.

As the latch gear 20 is unlocked, if the contact rod 81 of the sensor switch 80 is protruded further, the contact of all the components is cut off and the motor 70 is cut off from the power, thereby the driving motor 70 is de-energized after one cycle of rotation.

25 Further, referring to the fourth embodiment of the present invention, the fall gear 30 is in the shape of a reversed "C" and includes the protrusion 31', under

which a manual unlocking lever gear 51a is installed and a manual unlocking lever 51b protrudedly formed outside of the housing block 10. The manual unlocking lever gear 51a and the manual unlocking lever 51b are associated with a driving shaft 90. The protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed inside automobiles for driver's manual operation, thereby operating the door latch and locking body 100.

The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown) and an exposed electric member 41 of a driving means 40 is surrounded with a safety tube 46. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external instruments can forcibly invade the entrance part. Further, the protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed to the inside of automobiles for driver's manual operation but not exposed in the door panel to prevent the car theft. It is possible to prohibit the use of abnormal instruments or all-purpose tools to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from the door handle housing and instead a key sensor is provided for remote control according to the on/off signals, thereby assuring of the security of the car.

Fig. 6 is a perspective view a fifth embodiment of the door latch and locking system, in which a motor is adopted as a driving means.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several view.

In a door latch and locking system 100 as shown in Fig. 6, a latch gear 20 is installed at one end part of a driving shaft 90 rotatably with relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least two-stepped

suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by the elastic force of the elastic spring 34.

5 The fall gear 30 includes protrusions 31 and 31', and is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the locking groove 22 of the latch gear 20 by elastic force of the elastic spring 34.

10 The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown). The fall gear 30 is in the shape of a reversed "C" and includes the protrusions 31 and 31'. An unlocking lever gear 54' is installed under the protrusion 31' of the fall gear 30 and connected with an end part of a driving shaft 90. An unlocking cam gear 54" is protrudedly formed outside of the housing block 10, and connected in the middle of the driving shaft 90. At  
15 one side of a unlocking cam gear 54", an external manual unlocking lever 53b is installed and rotates with relation to a rotation shaft 53a.

In the above electric door latch and locking system, since this manual operating system is necessary for emergency, the present invention provides such a manual operation system as described hereinabove and the manual  
20 operation system is not exposed to prevent abnormal contact of car theft.

The driving shaft 90 is externally connected with a motor 70 through a rotation cam 60 so that the rotation cam 60 rotates in response to the operation of a motor 70. If the motor 70 is driven, the unlocking cam 54' rotates by power transmitted through the rotation cam 60 and the protrusion 31' of the fall gear  
25 30 is released from the locking groove 22 of the latch gear 20, so that the released latch gear 20 rotates by the elastic spring 24 and the strike pin 75 is

released from the latch gear 20, thereby opening the door initially.

Hereinbelow, the way that the motor 70 opens the door according to electric signals in more detail.

5 In order to control the operation of the unlocking cam 54', power source of the motor 70 is connected with a sensor switch 80 of which electric contact is connected or cut off by the movement of the latch gear 20.

The sensor switch 80 has a contact rod 81 which is electrically turned on or off and comes in contact with the latch gear 20 which rotates with relation to the hinge shaft 23.

10 If the latch gear 20 is in the fully or half locked state, all the components are in contact each other and the motor 70 can be supplied with power. Therefore, if the sensor switch 80 is applied with power from external power source, the motor 70 is driven and the rotation cam 60 connected to the shaft of the motor 70, so that the fall gear 30 is operated and the protrusion 31 is  
15 released from the locking groove 22, thereby the latch gear 20 is unlocked.

As the latch gear 20 is unlocked, if the contact rod 81 of the sensor switch 80 is protruded further, the contact of all the components is cut off and the motor 70 is cut off from the power, thereby the driving motor 70 is de-energized after one cycle of rotation.

20 A manual unlocking lever gear 53b is protruded passing through the housing block 10 and connected with the unlocking cam gear 54", so that if a driver operates the manual unlocking lever 51b which is exposed to the inside of automobiles, the unlocking cam gear 54' operates the protrusion 31' thereby operating the door latch and locking body 100.

25 The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown) and an exposed electric member 41 of a driving means 40 is

surrounded with a safety tube 46. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external instruments can forcibly invade the entrance part. Further, the protruded part of the manual unlocking lever 51b is coupled with the door panel so that the manual unlocking lever 51b is exposed to the inside of automobiles for driver's manual operation but not exposed in the door panel to prevent the car theft. It is possible to prohibit the use of abnormal instruments or all-purpose keys to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from the door handle housing and instead a key sensor is provided for remote control according to the on/off signals, thereby assuring of the security of the car.

Fig. 8 is a schematical perspective view of principal parts of an electric door latch and locking system of automobiles according to a sixth embodiment of the present invention and Fig. 9A to Fig. 9C are sectional-views to explain the operation of the door latch and locking system as shown in Fig. 8.

In a door latch and locking system 100 as shown in Fig. 8, a striker pin 75 of a housing block 10 is constrained in or released from a latch gear 20. The latch gear 20 is installed rotatably with relation to a hinge shaft 23 and includes locking grooves 21 and 22 for at least two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 is installed at one side of the latch gear 20 and includes protrusions 31 and 31' to be suspended by the locking grooves 21 and 22 of the latch gear 20, so that the fall gear 30 is coupled with the latch gear 20. The fall gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by elastic force of the elastic spring 34.

The housing block 10 is covered with a casing 11 to be attached on a door



panel (not shown) and has a through-hole 10' to insert a safety tube 46 wrapping an electric member 41 of a driving means 40 to protect it. The door latch and locking body 100 and the driving means 40 are separately installed, for example, in such a manner that the driving means 40 is installed in a door panel  
5 securing the shifting range of a window glass.

The separately installed electric member 41 of the driving means 40 is introduced into the through-hole 10' of the housing block 10 to be coupled with a connecting hole 301 of the fall gear 30 in the housing block 10. The fall gear 30 is coupled with the latch gear 20 by inserting its protrusion 31 into a locking  
10 groove 22 of the latch gear 20. A manual unlocking lever gear 51a is installed under the other protrusion 31' of the fall gear 30 and associated with a manual unlocking lever 51b at one end part thereof.

A door latch and locking body 100 has a through-hole 10" to insert a safety tube 311 wrapping an electric member 312 of a manual lever 313 to protect it.  
15 The door latch and locking body 100 and the manual lever 313 are separately installed. The separately installed manual lever 313 extends via the through-hole 10" of the housing block 10 to be coupled with a connecting hole 331 of the unlocking lever gear 51a in the housing block 10.

If the manual lever 313 is driven manually, the protrusion 31' of the fall  
20 gear 30 moves and the other protrusion 31 thereof is released from the locking groove 22 of the latch gear 20, so that the released latch gear 20 rotates by the elastic force of the elastic spring 24 and the strike pin 75 is released from the latch gear 20, thereby opening the door initially.

A sensor switch 80 is located between the other end part of the latch gear  
25 20 and a lower end part of the housing block to turn on or off the power supply with relation to the driving means 40 by sensing an operation position of the

latch gear 20. Also, the sensor switch 80 serves as a second safety system for cutting off overload of electric energy with relation to the driving means 40.

If the latch gear 20 is in the fully or half locked state, all the components are in contact each other and the motor 70 can be supplied with power.

5 Therefore, if the sensor switch 80 is applied with power from external power source, the motor 70 is driven and the rotation cam 60 connected to the shaft of the motor 70, so that the fall gear 30 is operated and the protrusion 31 is released from the locking groove 22, thereby the latch gear 20 is unlocked.

All of the components are assembled and coupled in the housing block 10  
10 and then completely sealed with the cover case 11. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external instruments can forcibly invade the entrance part. Also, the electric members 41 and 312 which are exposed to the outside are wrapped by the safety tube 46 and 311. Further, the protruded part of the manual lever 313 is coupled with the  
15 door panel so that the manual lever 313 is exposed to the inside of the automobile for driver's manual operation but not exposed in the door panel to prevent the car theft.

According to the above door latch and locking system of the present invention, it is possible to prohibit the use of abnormal instruments or all-  
20 purpose tools to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from a door handle housing and instead a key sensor is provided for remote control according to the on/off signals, thereby assuring of the security of the car.

The housing block 10 is preferably in the shape of cylinder, however, it is  
25 also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and shifting

range of the window glasses, so as to secure enough space to couple the driving means 40 or the manual lever 313 onto the outer surface of the housing block 10.

The driving means 40 is to be an actuator or other electronic means capable  
5 of cylinder operation, and more preferably to be a solenoid equipment.

The fall gear 30 is in the shape of a reversed "C" and includes the the protrusions 31 and 31' and a connecting hole 301. The fall gear 30 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported. The fall gear 30 is also coupled with the manual lever 51a under the protrusion 31'. The manual  
10 lever 51a is associated with the manual lever 313 which is protruded outside.

Fig. 10 is a schematical perspective view of principal parts of an electric door latch and locking system of automobiles according to a seventh embodiment of the present invention, in which the door latch and locking system may be operated manually even in case of trouble in the driving means.

15 In order to promote understanding, similar or same parts are indicates by the same symbols as shown in Fig. 4 and Fig. 5.

Referring to Fig. 10, in a door latch and locking system 100, a striker pin 75 of a housing block 10 is constrained in or released from a latch gear 20. The latch gear 20 is installed rotatably with relation to a hinge shaft 23 and includes  
20 locking grooves 21 and 22 for at least two-stepped suspension. An elastic spring 24 is provided on the hinge shaft 23.

A fall gear 30 having a protrusion 31 is coupled to a hinge shaft 32 on which an elastic spring 34 is supported, so that the fall gear 30 returns to the latch gear 20 by elastic force of the elastic spring 34.

25 The housing block 10 is covered with a casing 11 to be attached on a door panel (not shown) and has a through-hole 10' to insert a safety tube 46 wrapping

an electric member 41 of a driving means 40 to protect it. The door latch and locking body 100 and the driving means 40 are separately installed and, especially, the driving means 40 is installed in a door panel securing the shifting range of a window glass.

5       The separately installed electric member 41 of the driving means 40 is introduced into the through-hole 10' of the housing block 10 to be coupled with a connecting hole 301 of the fall gear 30 in the housing block 10. The fall gear 30 is coupled with the latch gear 20 by inserting its protrusion 31 into a locking groove 22 of the latch gear 20.

10       A manual operation means 305 is provided beside the driving means 40 for users' manual operation in case of trouble in the driving means 40. In the manual operation means 305, a manual lever 304 is connected to the center of a hinge shaft so that the end part of the manual lever 304 which is associated to the hinge shaft may push a supporting plate 302 of the driving means 40.

15       If the manual lever 304 is driven manually, the protrusion 31' of the fall gear 30 moves and the other protrusion 31 thereof is released from the locking groove 22 of the latch gear 20, so that the released latch gear 20 rotates by the elastic force of the elastic spring 24 and the strike pin 75 is released from the latch gear 20, thereby opening the door initially.

20       A sensor switch 80 is located between the other end part of the latch gear 20 and a lower end part of the housing block to turn on or off the power supply with relation to the driving means 40 by sensing an operation position of the latch gear 20.

Also, the sensor switch 80 serves as a second safety system for cutting off  
25   overload of electric energy with relation to the driving means 40.

All of the components are assembled and coupled in the housing block 10

and then completely sealed with the cover case 11. Even though an entrance part to insert the latch gear and the striker pin is exposed, no external instruments can forcibly invade the entrance part. Also, the electric member 41 which is exposed to the outside is wrapped by a safety tube 46. Further, the protruded part of the manual lever 304 is coupled with the door panel so that the manual lever 304 is exposed to the inside of the automobile for driver's manual operation but not exposed in the door panel to prevent the car theft.

According to the above door latch and locking system of the present invention, it is possible to prohibit the use of abnormal instruments or all-purpose tools to forcibly open the door since the conventional key-lock cylinder box operating mechanically is removed from a door handle housing and instead a key sensor is provided for remote control according to the on/off signals, thereby assuring of the security of the car.

The housing block 10 is preferably in the shape of cylinder, however, it is also possible according to the present invention to variously modify the shape of the housing block 10 in view of the structure of the door panel and shifting range of the window glasses, so as to secure enough space to couple the driving means 40 or the manual lever 304 onto the outer surface of the housing block 10.

The driving means 40 is to be an actuator or other electronic means capable of cylinder operation, and more preferably to be a solenoid equipment.

Figs. 11A to 11F are circuit diagrams of the door latch and locking system according to the present invention. In Figs. 11A to 11F, a storage battery installed in a car as a main power source is connected with a battery 600 and a socket 500 prepared for emergency to be connected to an external battery or spare battery. The principal power source is also connected to an on/off switch

400 or a key lock cylinder 200 installed in a driver's seat and next seat thereof for remote control. The principal power past through respective key lock cylinders or principal key systems is supplied to respective door handle switches 300 which are installed in all doors of the car.

5 As a user manipulates at least two on/off switches or a key-lock cylinder to unlock the door, current flows to the door handle 300. If the door handle 300 is slightly pulled, its terminal becomes connected with the principal power supply so that the power supply is transmitted to a driving means 40 through its output terminal.

10 As shown in Fig. 11A, after the key-lock cylinder 200 is unlocked, if the user pulls the door handle 300, the driving means 40 is energized and the door latch and locking body 100 is unlocked to open the door.

In case of emergency, for example, that the battery of the car is fully discharged, according to a prior art, the user has to open a bonnet of his car and  
15 connect an emergency battery jump line to the battery both in the mechanical door latch and locking system and the semi-automatic door latch and locking system. However, according to the present invention, the emergency battery power source is connected to the external socket 500 without opening the bonnet so as to supply power to the door latch and locking system even in case  
20 of unlocking, since the socket 500 is already connected with the battery.

In Fig. 11b, a remote controller 400 is connected to the principal power supply instead of the key-lock cylinder 200 to lock or unlock the door by using an on/off remote switch, so that the inconvenience caused by manipulating key is resolved and it becomes also possible to prevent the invasion of the all-  
25 purpose keys.

In Fig. 11C, after the key lock cylinder 200 is unlocked, when users pull the

door handle 300, the motor 70 is energized and the door latch and locking body 100 is unlocked to be opened.

In Fig. 11D, the main power supply and the key lock cylinder 200 are removed and a main power supply, a remote controller 400 and a on/off switch  
5 which may be locked and unlocked remotely under the control of the remote controller 400 are installed so that the inconvenience due to the key manipulation is removed and the all-purpose tools may not be inserted.

Now referring to Fig. 11E, after the key lock cylinder 200 is unlocked, when users pull the door handle 300, the driving means 70 is energized and the  
10 door latch and locking body 100 is unlocked to be opened.

Referring to Fig. 11F, the main power supply and the key lock cylinder 200 are removed and a main power supply, a remote controller 400 and a on/off switch which may be locked or unlocked remotely under the control of the remote controller 400 are installed so that the inconvenience due to the key  
15 manipulation is removed and the all-purpose tools may not be inserted.

Fig. 12 is a construction view of the door handle switch 300 according to the present invention, in which the switch 300 is switched by contacting an earth terminal 81' installed in a door housing 83 with an earth plate 82 when the user pulls a handle 80'.

20 Hereinbelow, the operation of the switch 300 is described in more detail with reference to Figs. 2A to 2C.

As the striker pin 75 is inserted into a locking groove 42 of the latch gear 20 and the protrusion 31 of the fall gear 30 is inserted into the other locking groove 22, the door latch and locking body 100 is unlocked as shown in Fig.  
25 2A. If the driving means 40 is energized according to an electric on-signal so that the electric rod 41 pulls the fall gear 30, the protrusion 31 is released from

the locking groove 22 and the striker pin 75 is also released from the latch gear 20 as shown in Fig. 2B, thereby keeping the door opened.

In this case, the principal power supply 600 is to be in a normal state.

In case that the driving means 40 is in trouble, if the user gets in the car  
5 through another door and manipulates the manual unlocking lever gear 51b which is protruded in the car, the other manual unlocking lever gear 51a and the protrusion 31' are rotate simultaneously with the hinge shaft 32 and the fall gear 30 integrated with the hinge shaft 32, so that the latch gear 20 is unlocked and the striker pin 75 is released, thereby opening the door. Therefore, according  
10 to the present invention, the door latch and locking system can be still operated by the manual unlocking gears even when the driving means 40 malfunctions.

Now, the circuit diagrams will be explained in more detail referring to Figs. 11E and 11F.

If current is supplied to the door handle switch 300 by manipulating the  
15 remotely controlled on/off switch 400 or a main key-lock cylinder 200, the door is unlocked by the power supply. To the contrary, if the supply of current is cut off by a reverse operation, the power supply to the respective door handle switch 300 is cut off, thereby locking the door.

Also, if the sensor switch 80 is applied with the external power supply, the  
20 driving means 40 is energized to drive the fall gear 30 so that the protrusion 31 is released from the locking groove 22 to open the latch gear 20.

As the latch gear 20 is unlocked, if the contact rod 81 of the sensor switch 80 is protruded further, the contact of all the components is cut off and the  
25 driving means 40 is cut off from the power, thereby the driving means 40 is de-energized after one cycle of rotation.



In a seventh embodiment of the present invention, the locking and unlocking operations are omitted to explain since they are carried in the same manner in explained in the above embodiments of the present invention. If the driving means 40 is in trouble, since a manual lever 304 is installed at one side  
5 of the driving means 40 and connected to the center of a hinge shaft, an end part of the manual lever 304 which is associated to the hinge shaft 303 may push a supporting plate 302 of the driving means 40. If users manipulate the other end part of manual lever 304 which is protruded inside the automobile, the parts associated with this lever becomes operated manually to open the door latch and  
10 locking body 100.

According to the door latch and locking system of the present invention, it is possible to manufacture and assemble the system in more simply way at a relatively low cost since the complicated components installed externally to the rod of respective door handles, lever gears, and door locks. Further, it is also  
15 possible to prevent car theft and malfunction possibly caused by the car theft since the principal components of the door latch and locking systems and their accessories are compactly coupled and sealed so that no abnormal instruments can invade thereto unless the window glasses are broken.

20

According to the present invention, the conventional parts operating mechanically besides the key lock cylinder installed in door handle housings in the outside of doors are eliminated and an integral sealed door latch and locking system housing is provided to reduce manufacturing cost and to prevent all-  
25 purpose tools, a steel or hook from inserting into some gabs between external window glasses and the doors, and on/off sensor switches having various

frequencies are adopted to be remotely controlled. Therefore, as far as the door windows are not broken, the doors may not be opened by means of above abnormal instruments.

Those skilled in the art will readily recognize that various other  
5 modifications and changes may be made to the present invention without strictly following the exemplary application illustrated and described herein and without departing from the true spirit and scope of the present invention, which is set forth in the following claims.

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WHAT IS CLAIMED IS:

1. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and  
5 locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to  
constrain or release a striker pin by rotating with relation to a hinge shaft  
thereof;

a fall gear having a first protrusion corresponding to said locking grooves  
10 to be associated with said latch gear, a second protrusion and a connecting hole,  
and rotating with relation to a hinge shaft thereof,;

casings to cover said housing, one of said casings being attached to a door  
panel;

driving means installed on another casing and having an electric member  
15 which is integrated therewith, said electric member being pulled according to  
an electric signal and extended via a through-hole of said housing block to be  
fitted into a connecting hole of said fall gear;

a first manual unlocking lever gear installed under said second protrusion  
of said fall gear; and

20 a second manual unlocking lever gear protrudedly formed outside of said  
housing block;

wherein said first manual unlocking lever gear and said second manual  
unlocking lever are associated with a driving shaft.

2. An electric door latch and locking system according to claim 1, wherein  
25 a battery is installed in a car as a principal power source, on/off switch sensors  
serve as principal control key switches, being supplied with power from said

battery to output on-signal, and door handle switches are installed in all doors of the car and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and locking system, when a door handle is pulled.

- 5        3. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to constrain or release a striker pin by rotating with relation to a hinge shaft  
10 thereof;

a fall gear having a first protrusion corresponding to said locking grooves to be associated with said latch gear and coupled to a hinge shaft on which an elastic spring is supported, so that said fall gear returns to said latch gear by elastic force of said elastic spring;

- 15 casings to cover said housing, one of said casings being attached to a door panel;

driving means installed on another casing and having an electric member which is integrated therewith, said electric member being pulled according to an electric signal and extended via a through-hole of said housing block to be  
20 fitted into a connecting hole of said fall gear;

a first manual unlocking lever gear installed under said second protrusion of said fall gear; and

a second manual unlocking lever gear protrudedly formed outside of said housing block;

- 25 wherein said first manual unlocking lever gear and said second manual unlocking lever are associated with a driving shaft;

wherein said second unlocking cam gear having a connecting hole which is associated with said electric member of said driving means, so that pulling force of said driving means is transmitted through said electric member and the associated connecting hole to said second unlocking cam to consecutively  
5 operate all components; and

wherein an external unlocking lever is installed on one end part of said second unlocking cam, so that the external unlocking lever can be operated in case of emergency.

4. An electric door latch and locking system according to claim 3, wherein  
10 said first unlocking cam gear is connected with said second unlocking cam gears via said driving shaft, and said second unlocking cam gear has the connecting hole and connected with said external unlocking cam gear which has its own hinge shaft so as to be manually operated in case of emergency.

5. An electric door latch and locking system according to claim 3, wherein  
15 a battery which is a storage battery installed in a car as a main power source, on/off switch sensors serving as main control key switches, being supplied with power from said battery to output on-signal, and door handle switches installed in all doors of the car and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and  
20 locking system, when a door handle is pulled.

6. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to  
25 constrain or release a striker pin by rotating with relation to a hinge shaft thereof;

a fall gear having a first protrusion corresponding to said locking grooves to be associated with said latch gear and a second protrusion to which a manual unlocking lever gear is connected, and coupled to a hinge shaft on which an elastic spring is supported, so that said fall gear returns to said latch gear by  
5 elastic force of said elastic spring;

casings to cover said housing, one of said casings being attached to a door panel;

driving means including an electric member which is integrated therewith, and a safety tube for wrapping said electric means, said electric member being  
10 inserted into a through-hole of said housing block to be fitted into a connecting hole of said fall gear; and

wherein said manual unlocking lever gear is associated with an end part of a driving shaft, of which the other end part is associated with a manual unlocking lever.

15 7. An electric door latch and locking system according to claim 6, wherein said housing block has the through-hole, so that said electric member of said driving means which is wrapped with said safety tube extends via said through-hole of said housing block to said connecting hole of said fall gear and to be fitted therewith

20 8. An electric door latch and locking system according to claim 6, wherein all of principal components are assembled and coupled in said housing and then completely sealed with said cover casings, said through-hole of said housing block is closed connected with said safety tube wrapping said electric member, an entrance part to insert said latch gear and said striker pin is exposed and a  
25 manual unlocking lever is protrudedly formed to be exposed toward the inside of automobiles for driver's manual operation

9. An electric door latch and locking system according to claim 6, wherein a battery is installed in a car as a main power source, on/off switch sensors serve as main control key switches, being supplied with power from said battery to output on-signal, and door handle switches are installed in all doors of the car  
5 and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and locking system, when a door handle is pulled.

10. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and  
10 locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to constrain or release a striker pin by rotating with relation to a hinge shaft thereof;

a fall gear having a first protrusion corresponding to said locking grooves  
15 to be associated with said latch gear and coupled to a hinge shaft on which an elastic spring is supported, so that said fall gear returns to said latch gear by elastic force of said elastic spring;

said fall gear being coupled at the other side thereof with a rotation cam gear having a jaw; and

20 said rotation cam gear being externally connected with a motor so that said rotation cam gear rotates in response to operation of said motor in such a manner that if said rotation cam gear rotates, the jaw of said rotation cam comes into contact with the jaw of said fall gear and the protrusion of said fall gear is released from the locking groove of said latch gear, so that the released latch  
25 gear rotates by its elastic spring and said strike pin is released from said latch gear, thereby opening the door initially;

wherein in order to control the operation of said rotation cam, power source of said motor is connected with a sensor switch of which electric contact is connected or cut off by the movement of said latch gear.

11. An electric door latch and locking system according to claim 10,  
5 wherein said rotation cam is externally connected with a motor so that said rotation cam rotates in response to operation of said motor in such a manner that if said rotation cam rotates, the jaw of said rotation cam comes into contact with the jaw of said fall gear and the protrusion of said fall gear is released from the locking groove of said latch gear, so that the released latch gear rotates by its  
10 elastic spring and said strike pin is released from said latch gear, thereby opening the door initially.

12. An electric door latch and locking system according to claim 11, wherein in case that said latch gear is unlocked, if a contact rod of said sensor switch is protruded outwardly, contact of all the components is cut off and said  
15 motor is cut off from power, thereby said driving motor is de-energized after one cycle of rotation.

13. An electric door latch and locking system according to claim 10, wherein a battery is installed in a car as a main power source, on/off switch sensors serve as main control key switches, being supplied with power from  
20 said battery to output on-signal, and door handle switches are installed in all doors of the car and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and locking system, when a door handle is pulled.

14. An electric door latch and locking system of automobiles comprising:  
25 a housing block in which all principal components of a door latch and locking system are installed;



a latch gear having at least two locking grooves and an elastic spring to constrain or release a striker pin by rotating with relation to a hinge shaft thereof;

a fall gear having a first protrusion corresponding to said locking grooves  
5 to be associated with said latch gear and coupled to a hinge shaft on which an elastic spring is supported, so that said fall gear returns to said latch gear by elastic force of said elastic spring;

first and second unlocking lever gears associated with a driving shaft of which one end part is installed with a manual unlocking lever having its own  
10 driving shaft; and

a driving motor associated with one end part of said driving shaft;

wherein said unlocking cam gear rotates in response to operation of said motor so that if said rotation cam gear rotates, the protrusion of said fall gear is released from the locking groove of said latch gear, so that the released latch  
15 gear rotates by its elastic spring and said strike pin is released from said latch gear, thereby opening the door initially; and

wherein in order to control the operation of said rotation cam, power source of said motor is connected with a sensor switch of which electric contact is connected or cut off by the movement of said latch gear.

20 15. An electric door latch and locking system according to claim 14, wherein said motor is associated with said driving shaft which is connected with said unlocking cam gears.

16. An electric door latch and locking system according to claim 14, wherein in case that said latch gear is unlocked, if a contact rod of said sensor  
25 switch is protruded outwardly, contact of all the components is cut off and said motor is cut off from power, thereby said driving motor is de-energized after

one cycle of rotation.

17. An electric door latch and locking system according to claim 14, wherein a battery is installed in a car as a main power source, on/off switch sensors serve as main control key switches, being supplied with power from said battery to output an on-signal, and door handle switches are installed in all doors and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and locking system, when a door handle is pulled.

18. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to constrain or release a striker pin by rotating with relation to a hinge shaft thereof;

a fall gear having a first protrusion corresponding to said locking grooves to be associated with said latch gear, a second protrusion and a connecting hole, and rotating with relation to a hinge shaft thereof,;

a casing to cover said housing;

driving means having an electric member which is integrated therewith, said electric member being pulled according to an electric signal and extended via a first through-hole of said housing block to be fitted into a connecting hole of said fall gear; and

a manual unlocking lever gear installed under said second protrusion of said fall gear and connected with a manual lever extending via a second through-hole of said housing block to be coupled with a connecting hole of said fall gear, said manual lever being connected with an electric member which is

wrapped with a safety tube to protect it.

19. An electric door latch and locking system according to claim 18, wherein the second through-hole of said housing is inserted closely with said safety tube for wrapping said electric means of said driving means, and said  
5 door latch and locking body, said driving means and said manual lever are separately installed in a door panel securing shifting range of a window glass.

20. An electric door latch and locking system according to claim 18, wherein a sensor switch is located at one end part of said latch gear in said  
10 housing block to turn-on or turn-off power supply with relation to said driving means by sensing an operation position of said latch gear 20 and to cut off overload of electric energy with relation to said driving means as a second safety system.

21. An electric door latch and locking system according to claim 18,  
15 wherein a battery is installed in a car as a main power source, on/off switch sensors serve as main control key switches, being supplied with power from said battery to output an on-signal, and door handle switches are installed in all doors of the car and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and  
20 locking system, when a door handle is pulled.

22. An electric door latch and locking system of automobiles comprising:  
a housing block in which all principal components of a door latch and locking system are installed;

a latch gear having at least two locking grooves and an elastic spring to  
25 constrain or release a striker pin by rotating with relation to a hinge shaft thereof;

a fall gear having a first protrusion corresponding to said locking grooves to be associated with said latch gear and coupled to a hinge shaft on which an elastic spring is supported, so that said fall gear returns to said latch gear by elastic force of said elastic spring;

5 a casing to cover said housing;

a driving means which is separately installed and extends via an electric member along a through-hole of said housing block with a connecting hole of said fall gear to drive said fall gear; and

10 manual operation means provided at one side of said driving means for users' manual operation in case of trouble in the driving means and having a manual lever connected to the center of a hinge shaft so that an end part of said manual lever which is associated to said hinge shaft may push a supporting plate of said driving means.

23. An electric door latch and locking system according to claim 22,  
15 wherein the second through-hole of said housing is closely inserted with an electric means of said driving means which is wrapped with a safety tube, and said door latch and locking body and said driving means are separately installed in a door panel securing shifting range of a window glass.

24. An electric door latch and locking system according to claim 22,  
20 wherein a sensor switch is located at one end part of said latch gear in said housing block to turn-on or turn-off power supply with relation to said driving means by sensing an operation position of said latch gear 20 and to cut off overload of electric energy with relation to said driving means as a second safety system.

25 25. An electric door latch and locking system according to claim 22, wherein a battery is installed in a car as a main power source, on/off switch

sensors serve as main control key switches, being supplied with power from said battery to output an on-signal, and door handle switches are installed in all doors of the car and transmit the on-signal output from said on/off switch sensors to said driving means to provide power supply to said door latch and

5 locking system, when a door handle is pulled.

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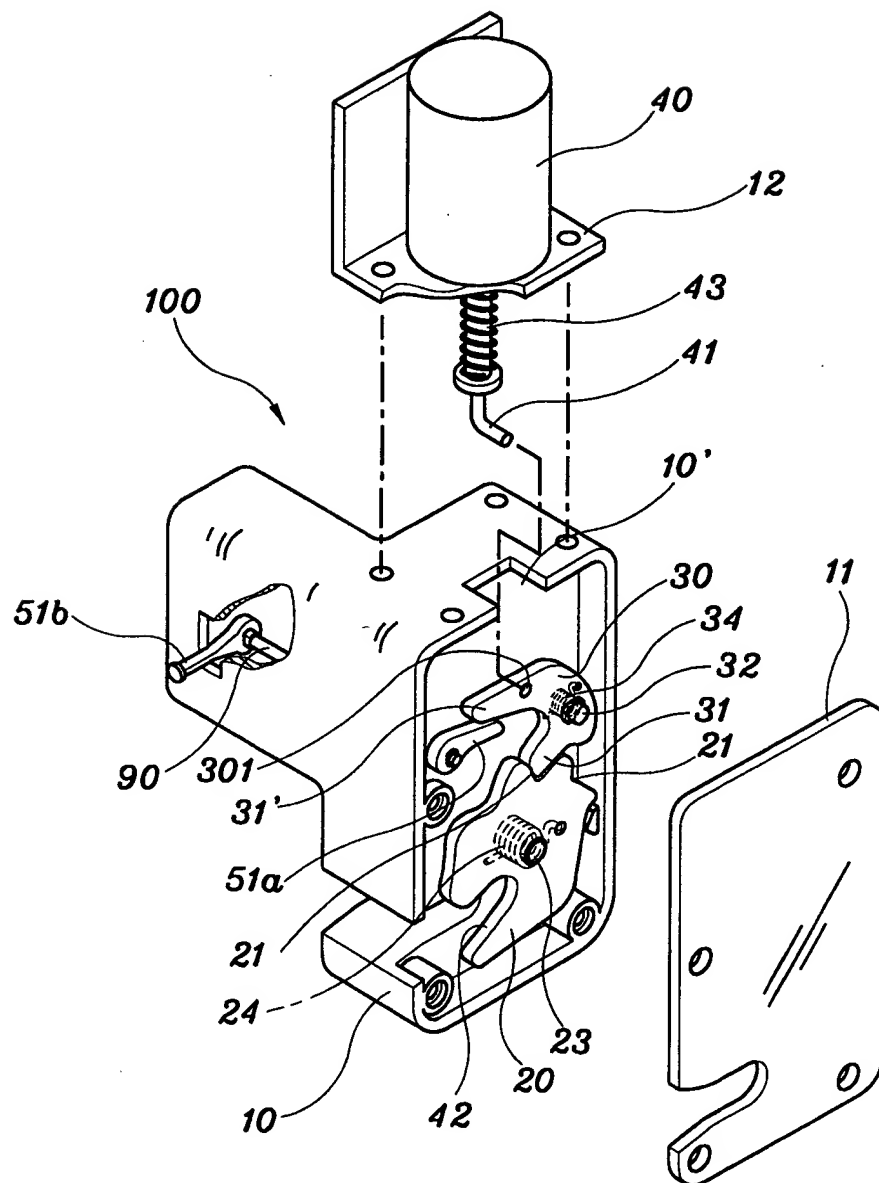
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Fig1

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Fig2

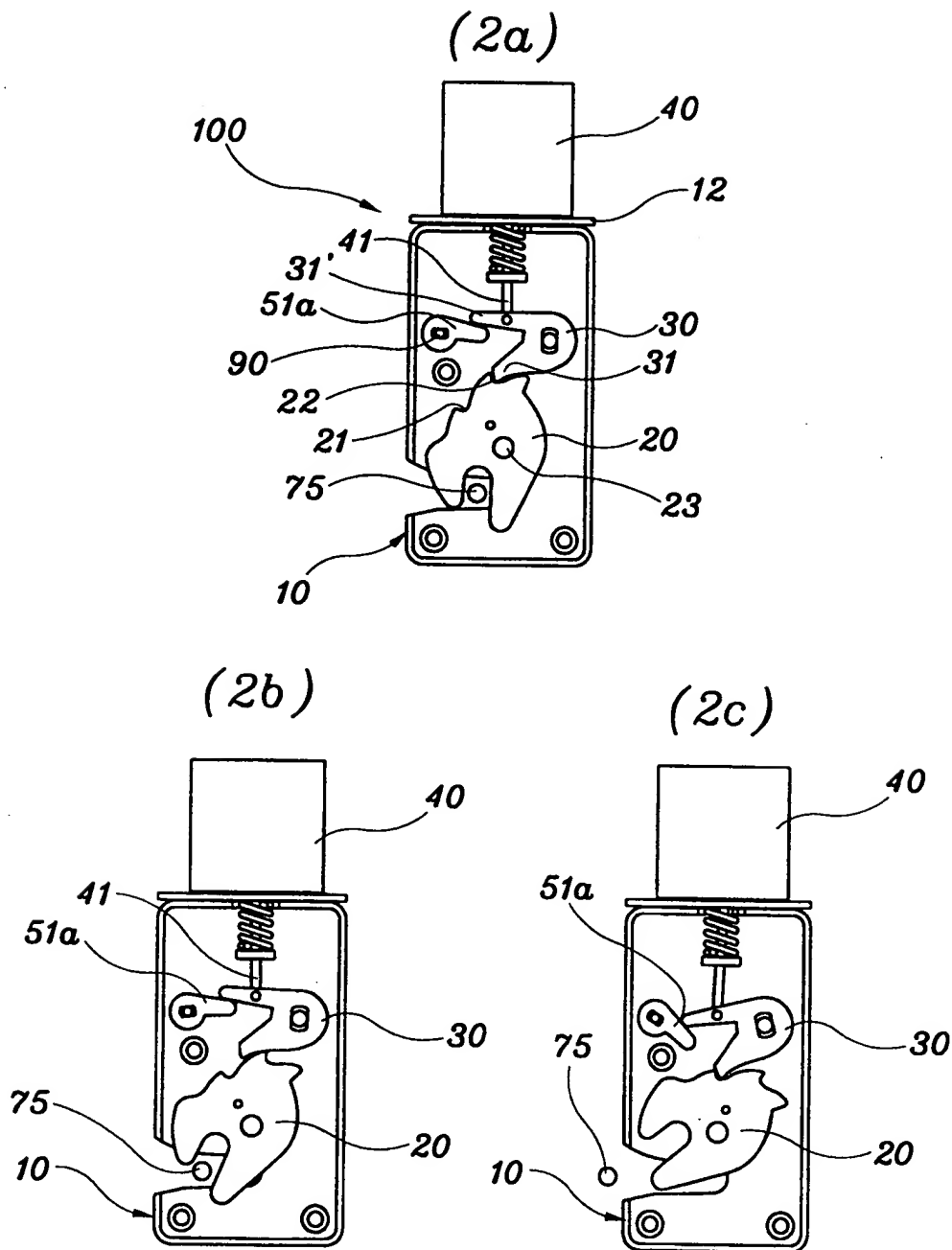
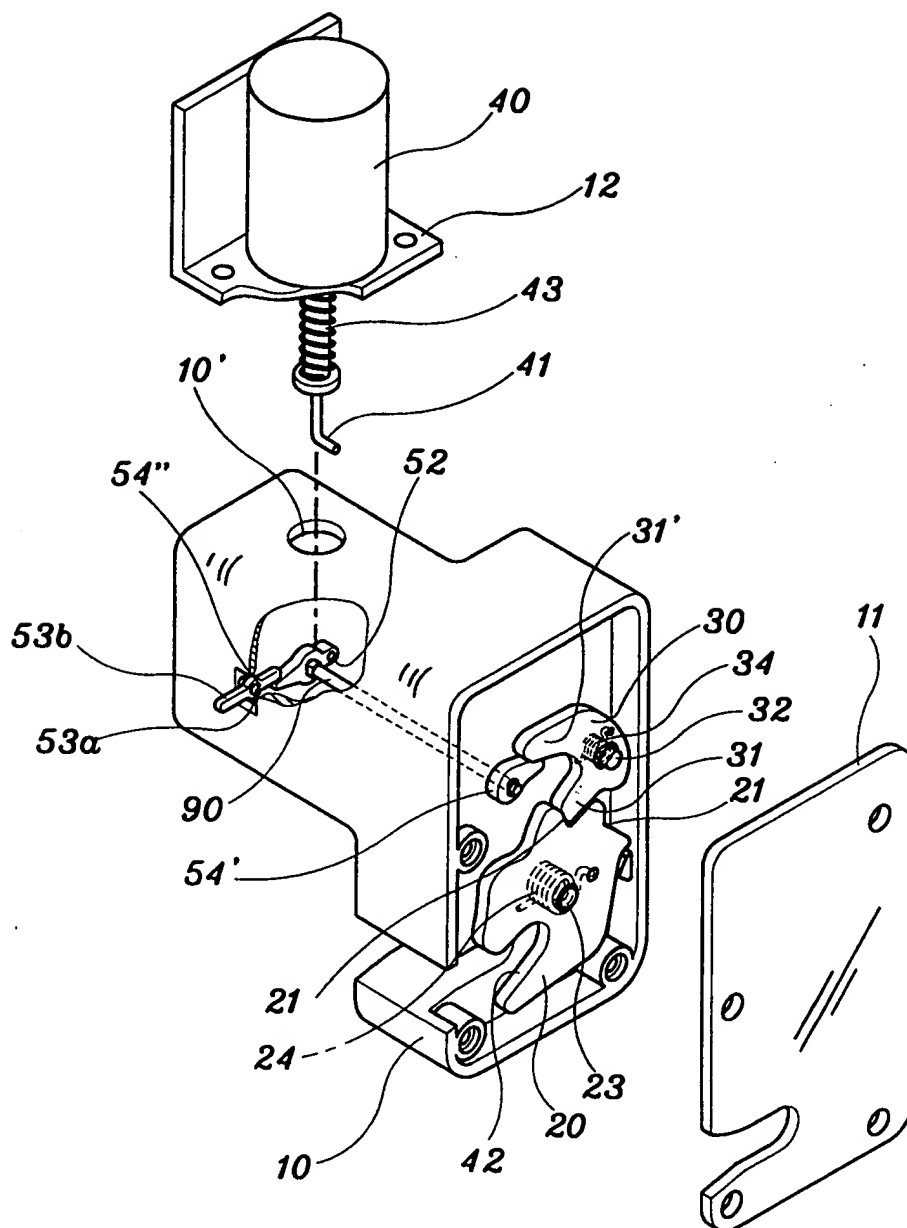


Fig3

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Fig4

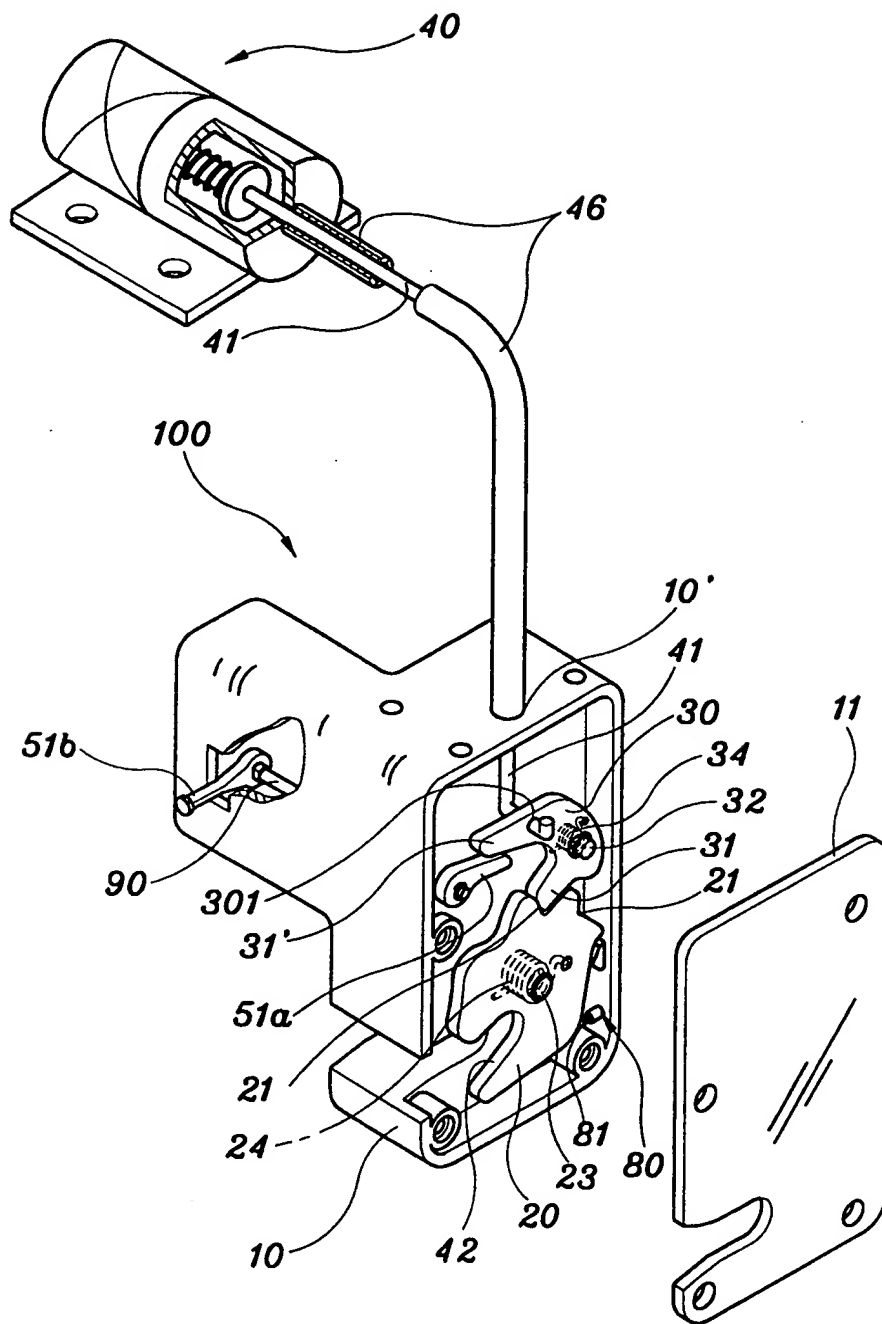




Fig 6

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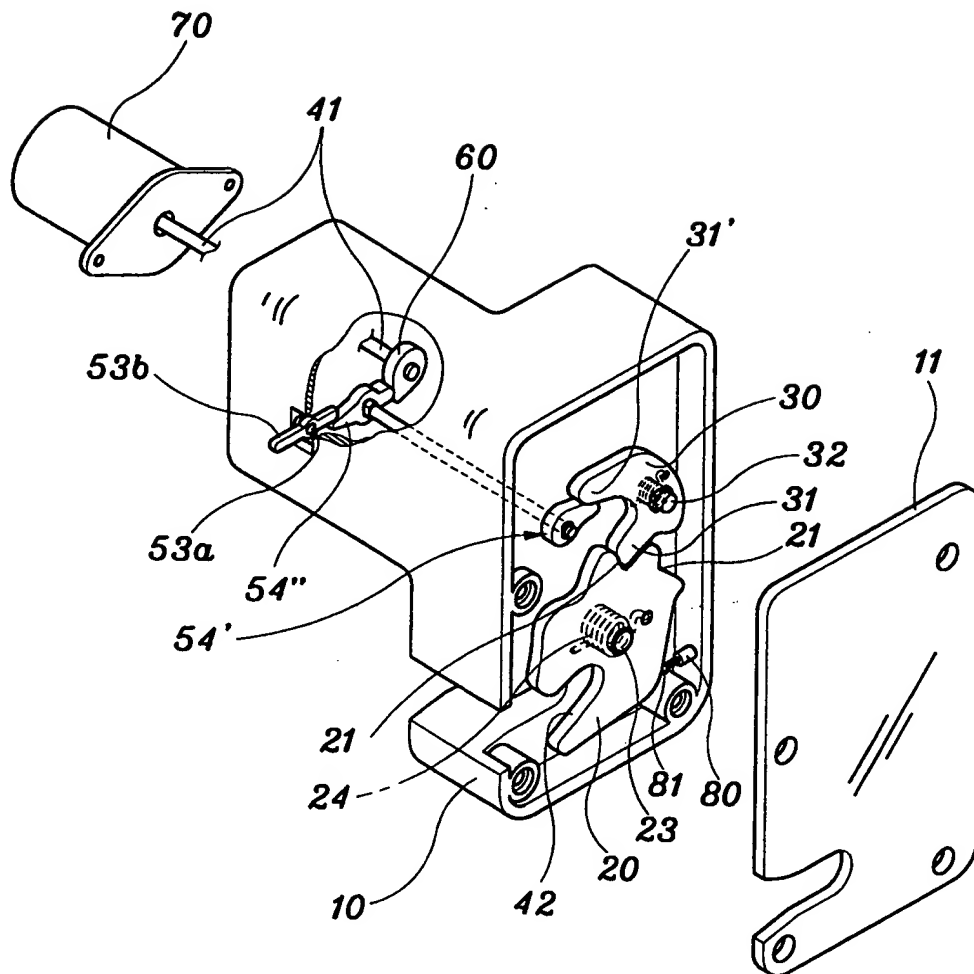


Fig 7

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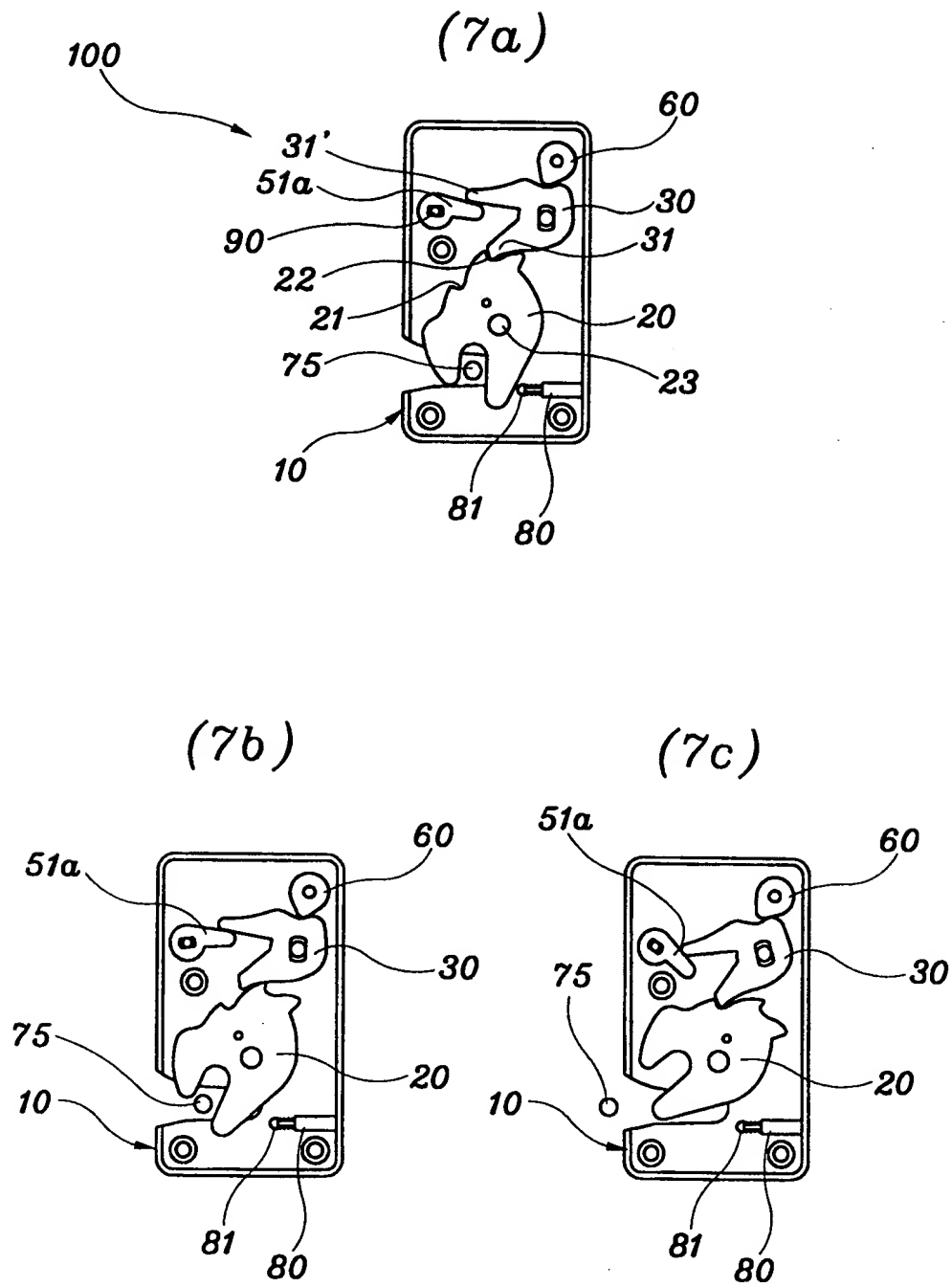


Fig8

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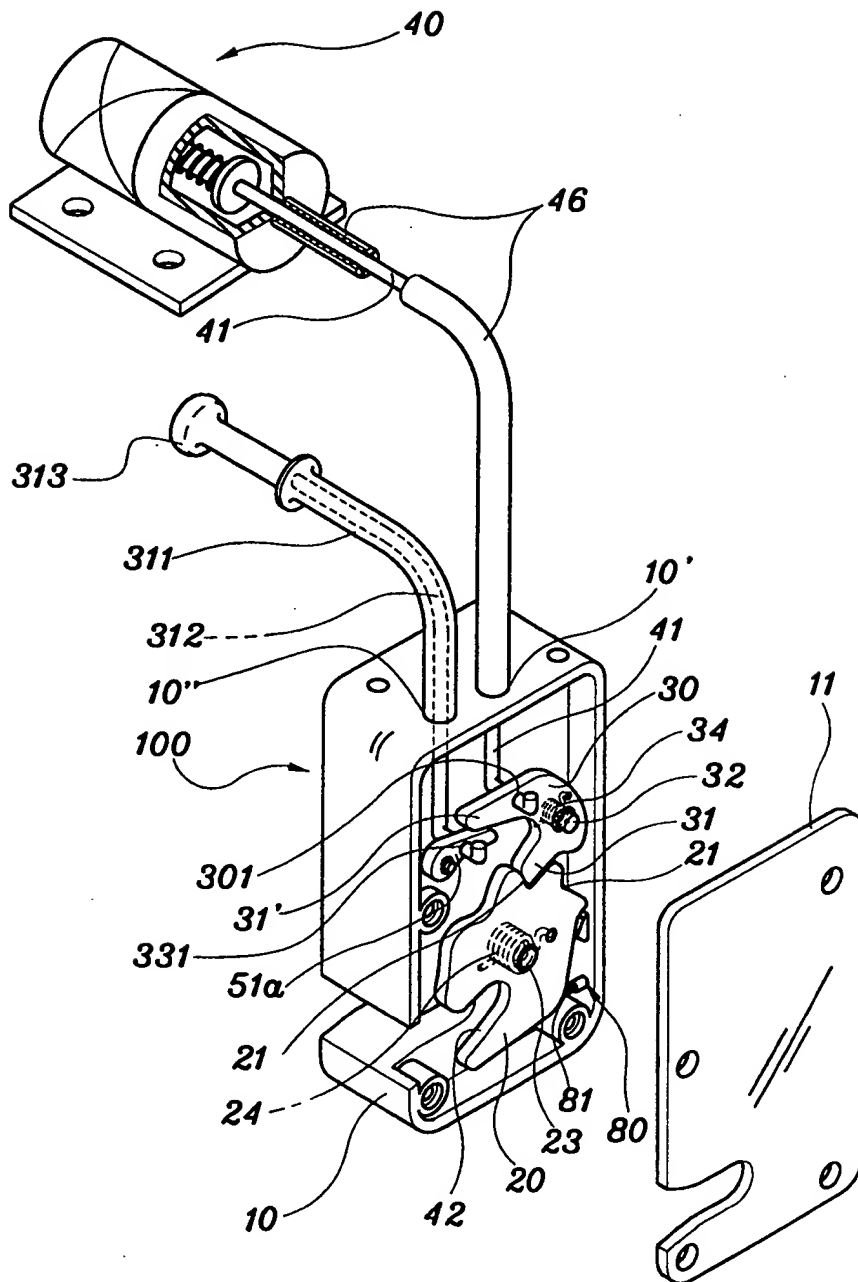
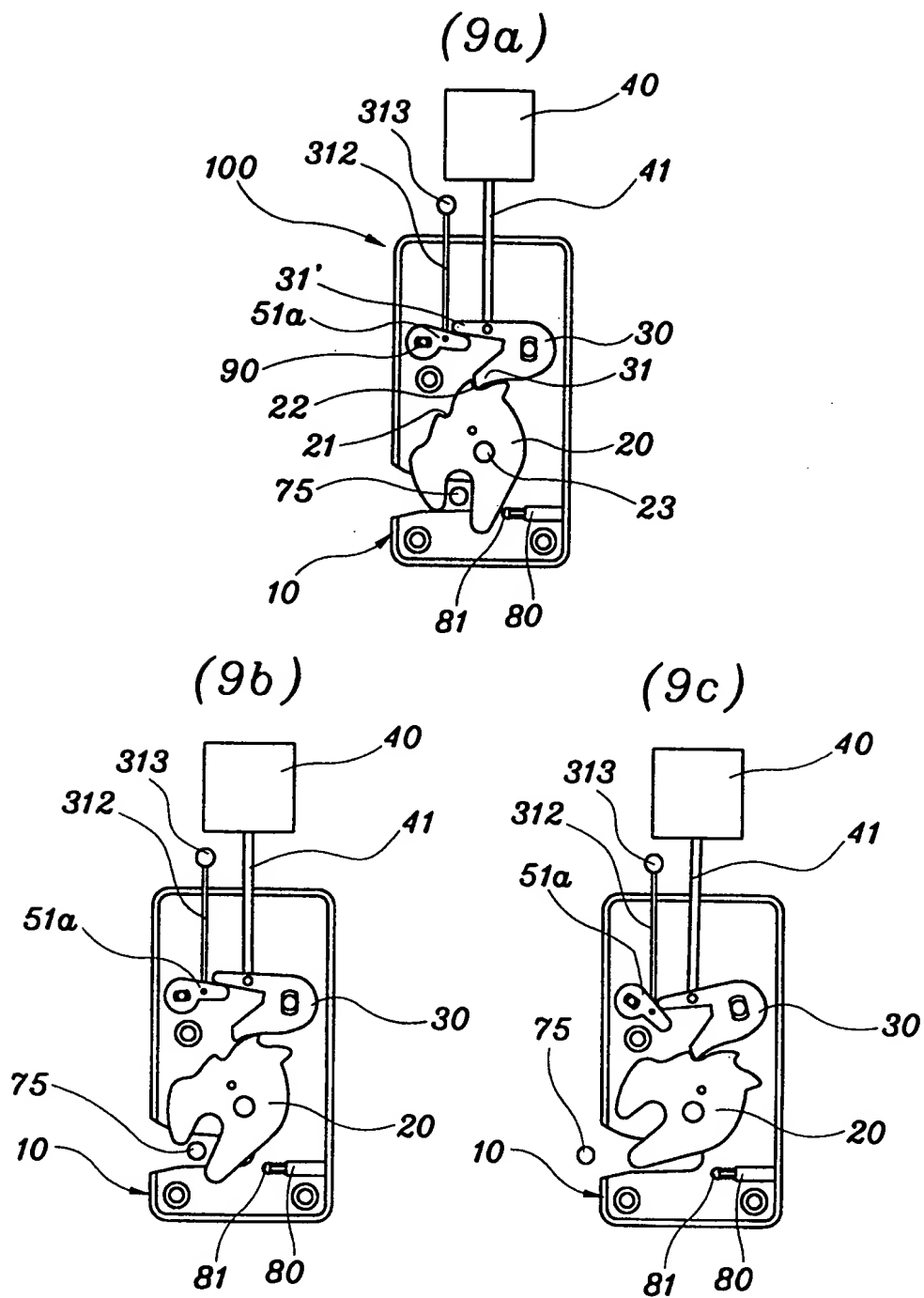


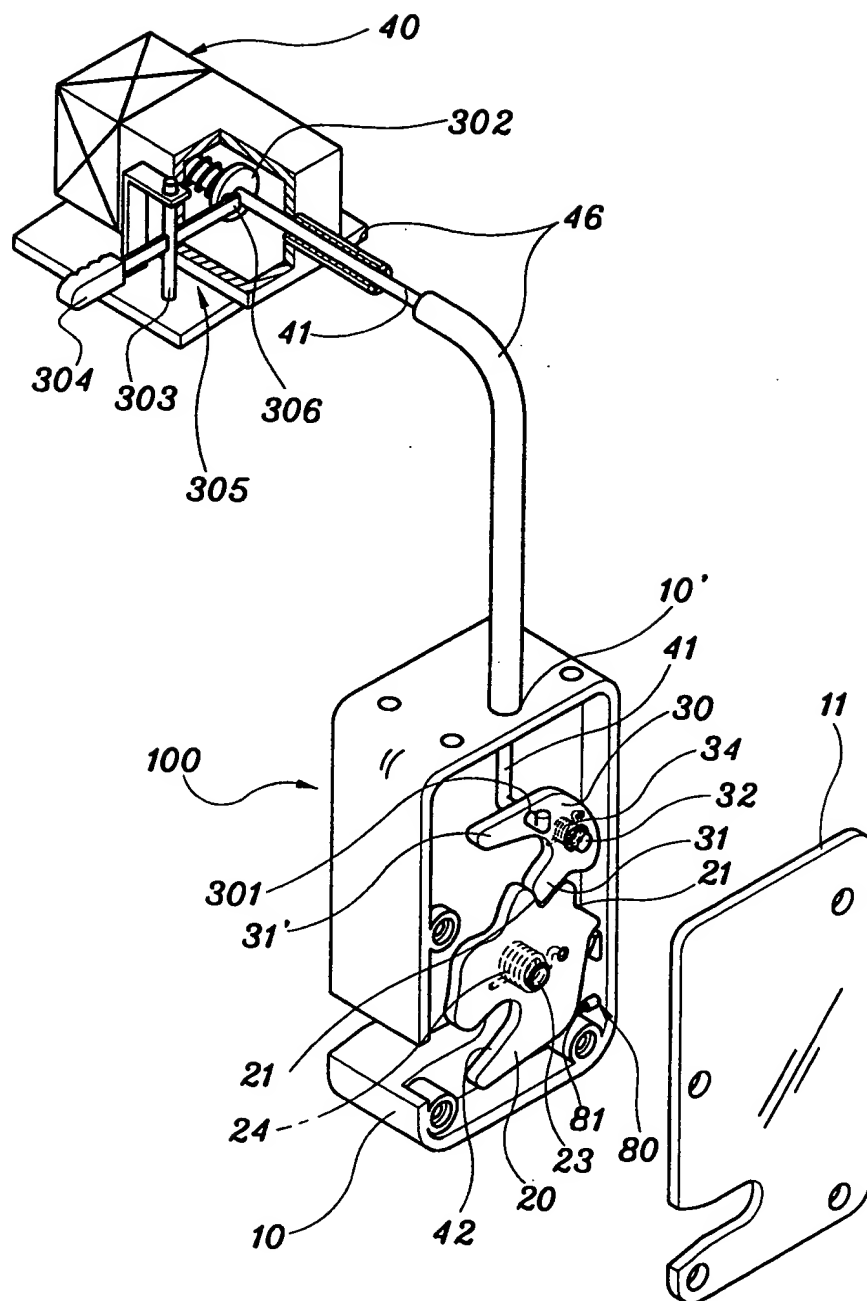
Fig9

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*Fig10*

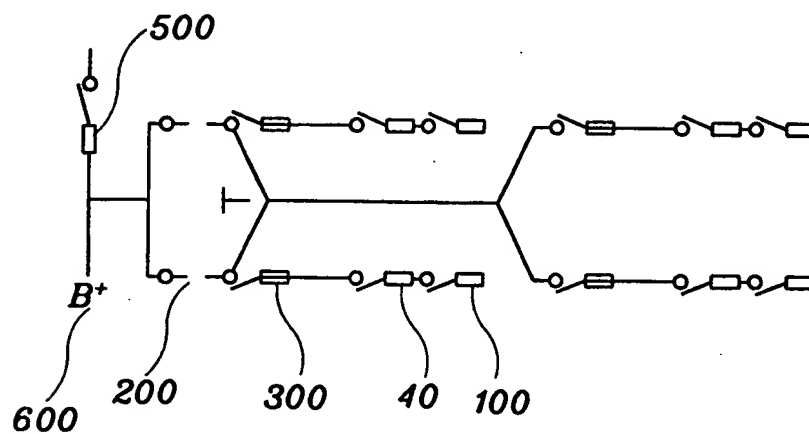
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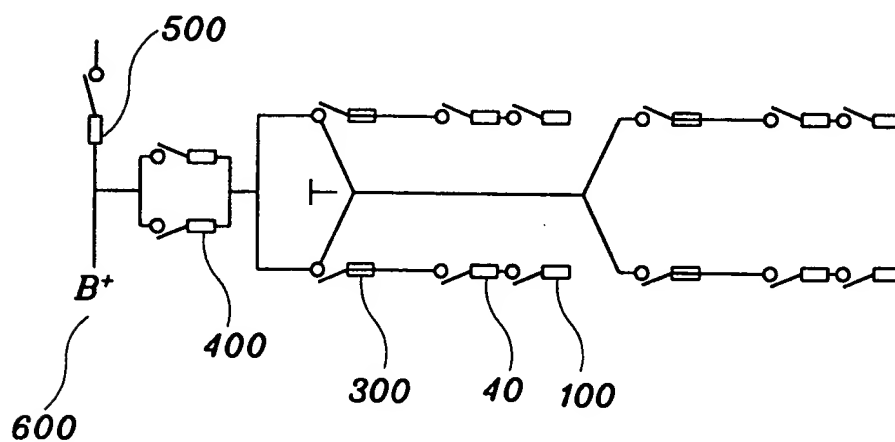
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Fig11

(11a)

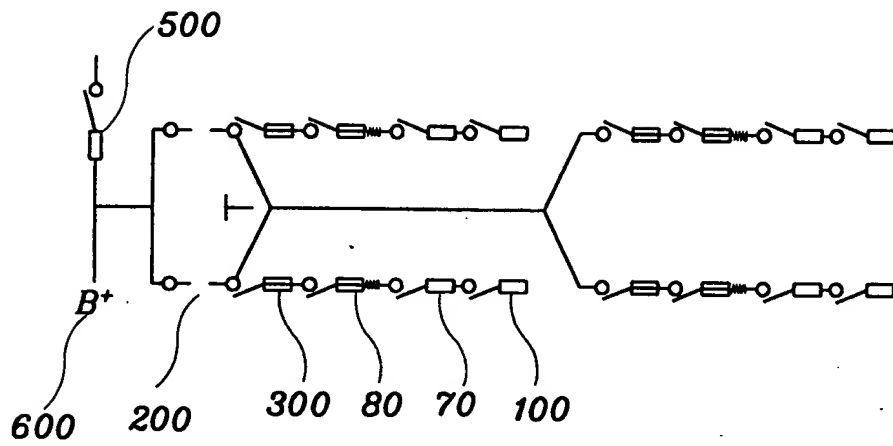


(11b)

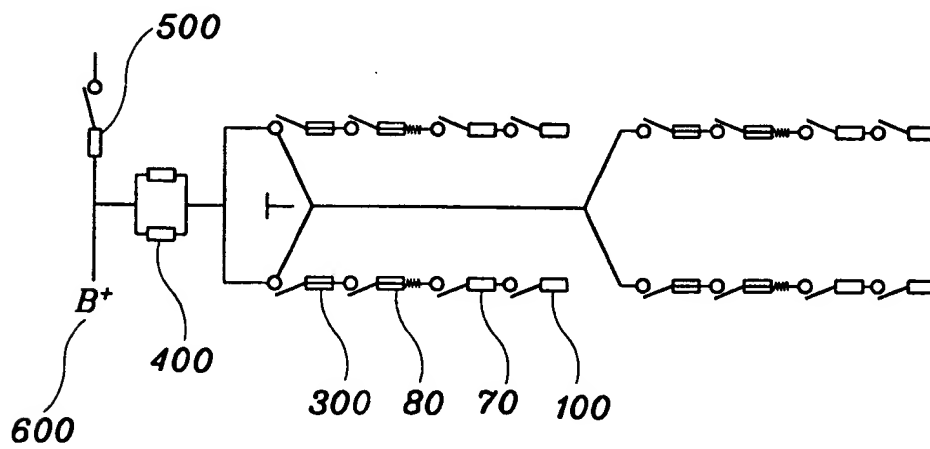




(11c)

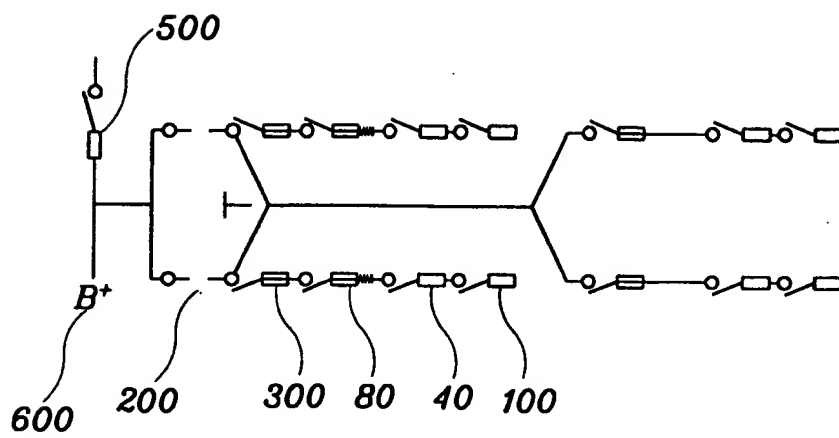


(11d)



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(11e)



(11f)

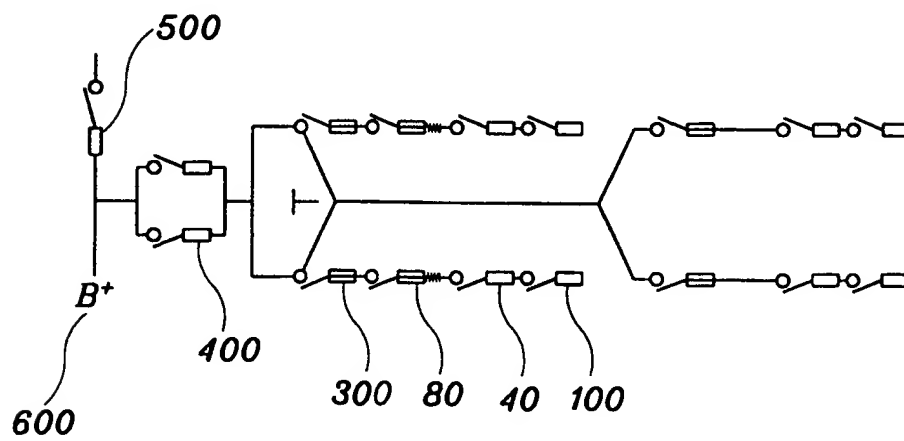
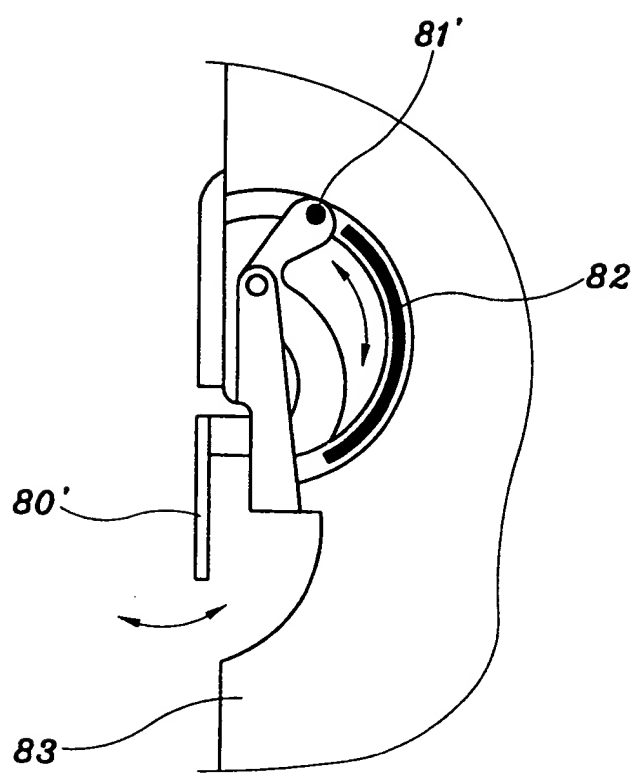
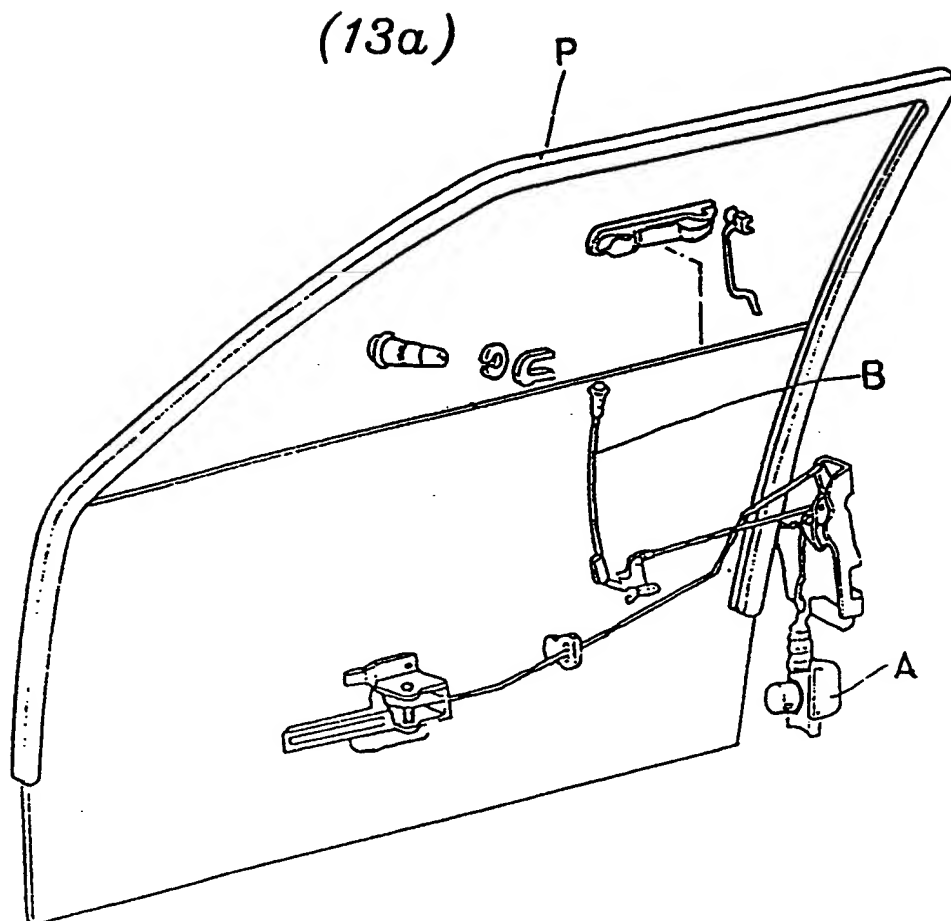


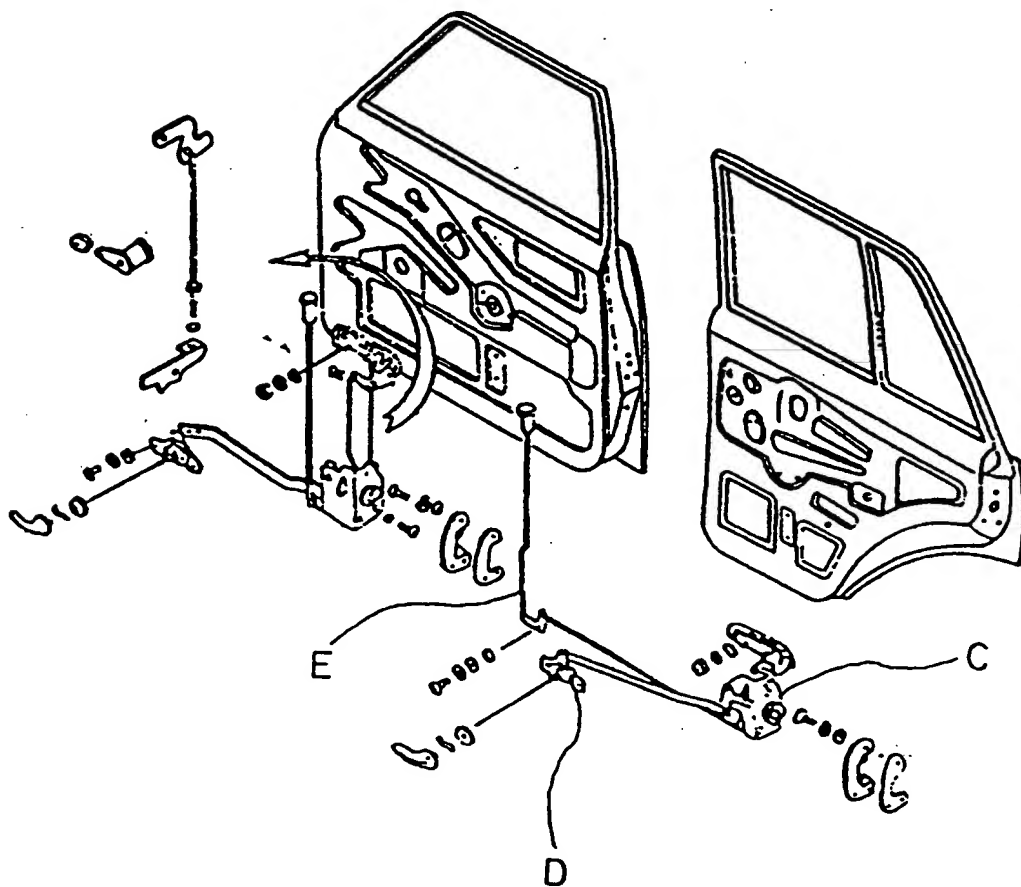
Fig12





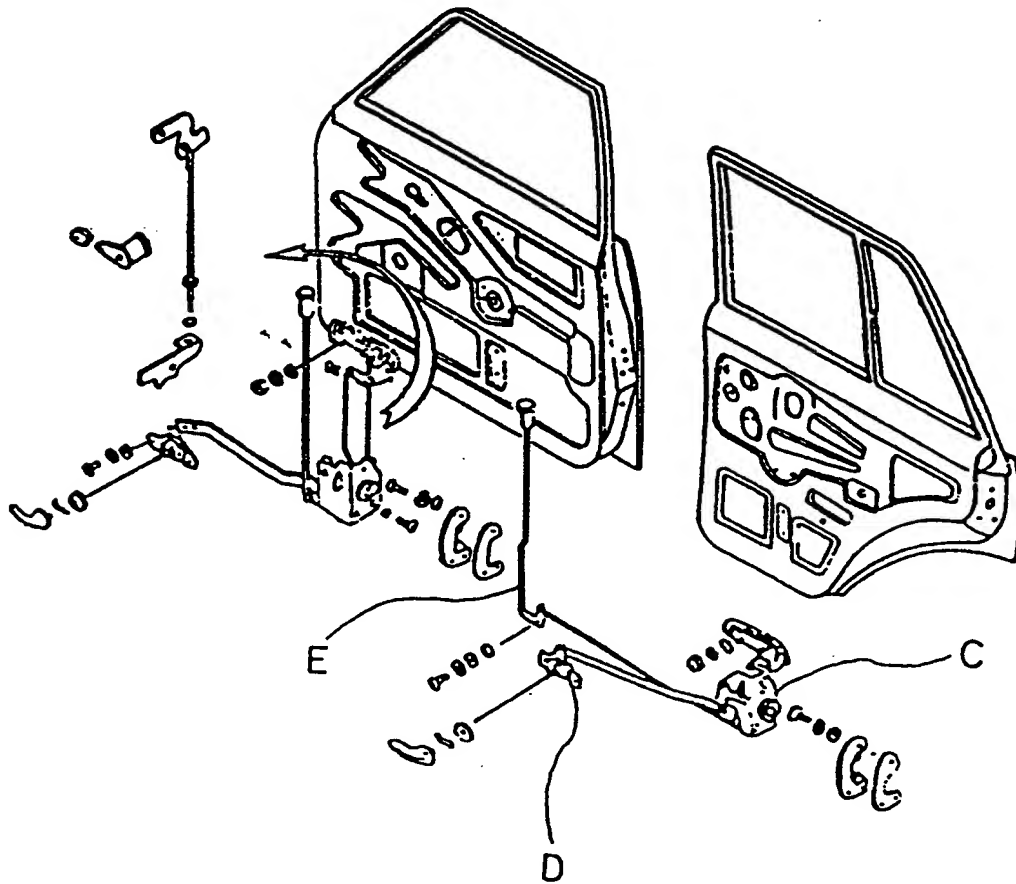
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(13b)



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(13c)



**A. CLASSIFICATION OF SUBJECT MATTER**

IPC<sup>6</sup>: E 05 B 65/32, 47/00  
 According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>6</sup>: E 05 B 65/32, 65/20, 47/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC

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Date of the actual completion of the international search

06 March 1998 (06.03.98)

Date of mailing of the international search report

18 March 1998 (18.03.98)

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